KRAMER ELECTRONICS, Ltd.

USER MANUAL

VIDEO ISOLATORS

Models:

OC-1N
OC-2
OC-4

<u>IMPORTANT</u>: Before proceeding, please read paragraph entitled "Unpacking and Contents"

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1. INTRODUCTION

Congratulations on your purchase of this Kramer Electronics Video Isolator.
Since 1981 Kramer has been dedicated to the development and manufacture of high quality video/audio equipment. The Kramer line has become an integral part of many of the best production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of the line, making the best even better. Kramer's line of professional video/audio electronics is one of the most versatile and complete available, and is a true leader in terms of quality, workmanship, price/performance ratio and innovation. In addition to the Kramer line of high quality switchers, such as the one you have just purchased, Kramer also offers a full line of high quality distribution amplifiers, processors, interfaces, controllers and computer-related products. This manual includes configuration, operation and option information of the Kramer **OC-1N**, **OC-2** and **OC-4** Video Isolators for the video professional.

1.1 Factors Affecting Quality of Results

There are many factors affecting the quality of results when signals are transmitted from a source to an acceptor as described below:

FACTOR	EFFECT
Connection cables	Low quality cables are susceptible to interference; they degrade signal quality due to poor matching and cause elevated noise levels. They should therefore be of the best quality.
Sockets and connectors of the sources and acceptors	So often ignored, they should be of highest quality, since "Zero Ohm" connection resistance is the target. Sockets and connectors also must match the required impedance (75ohm in video). Cheap, low quality connectors tend to rust, thus causing breaks in the signal path
Amplifying circuitry	Must have quality performance when the desired end result is high linearity, low distortion and low noise operation
Distance between sources and acceptors	Plays a major role in the result. For long distances between sources and acceptors, special measures should be taken in order to avoid cable losses. These include using higher quality cables or adding line amplifiers.
Interference from neighboring electrical appliances	These can have an adverse effect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio should be installed far from any mains power cables, electric motors, transmitters, etc. even when the cables are shielded

2. HOW DO I GET STARTED?

The fastest way to get started is to take your time and do everything right the first time. Taking 15 minutes to read the manual may save you a few hours later. You don't even have to read the whole manual. So if a certain section doesn't apply to you, you don't have to spend your time reading it.

3. UNPACKING AND CONTENTS

The items contained in your Kramer accessory package are listed below. Please save the original box and packaging materials for possible future transportation and shipment of the machine.

- Video Isolator
- Kramer concise product catalog/CD
- AC power cable
- 4 rubber feet
- This user Manual

3.1 Optional Accessories

The following accessories, which are available from Kramer, can enhance implementation of your machine. For information regarding cables and additional accessories, contact your Kramer dealer.

- **BNC "Y" Connector -** Used for looping purposes and splits the incoming signal to enable connection of an additional machine.
- **Rack Adapter -** Used to install smaller size machines in a standard 1U rack. One or more machines may be installed on each adapter.
- **VIDEO TESTER** - A new, unique, patented, indispensable tool for the video professional, the video Tester is used to test a video path leading to/from an amplifier. By pressing only one touch switch it can trace missing signals, distinguish between good and jittery (VCR sourced) signals, and identify the presence of good signals. Whenever a video signal is missing, because of bad connections, cable breaks or faulty sources, the video Tester is all you need.
- **VM-5ARII** – for distributing the isolated outputs of the OC machines. The KRAMER **VM-5ARII** is an ultra-high bandwidth, *Video Audio Distribution Amplifier* designed for studio and other demanding applications. The **VM-5ARII** splits a single input source into five identical outputs with no discernible signal degradation. The machine has looping inputs for system extension. The user can adjust video gain and EQ. control as well as audio L and R levels externally. The **VM-5ARII** allows AC/DC video input coupling selection and has a video termination switch simplifying looping. The machine operates in Audio-follow-Video mode, and has fully buffered, Broadcast level, audio stereo outputs.

4. GETTING TO KNOW YOUR OC-1N VIDEO ISOLATOR

The KRAMER **OC-1N** is a high quality Video Isolator unit, designed for broadcast and industrial studio applications. In contradiction to the commercially available machines, which are based on non-linear transformers, with poor frequency response, the **OC-1N** is designed around a state-of-the-art active opto-isolator device with extremely high linearity and very wide frequency response. The **OC-1N** allows the user to select which GROUND becomes floating - input, output, both or none, using rear panel switches. The **OC-1N** eliminates problems related to video hum, ground loops, DC offsets and a host of interfering factors, which upset video picture

quality. The **OC-1N** is housed in a compact enclosure; making it suitable for use in the most space-limited places. The machine allows external fine-tuning of output video levels and frequency response compensation via trimmers accessible from the rear panel. Front/Rear panel features of the **OC-1N** are described in Figure 1 and Table 1.

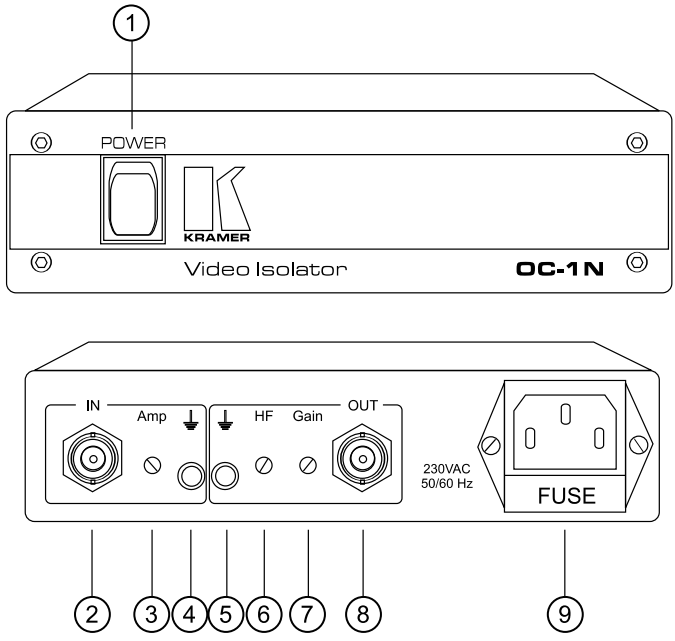

Figure 1: OC-1N front/back features

Table 1: OC-1N Front/Rear Panel Features

	Feature	Function
1.	**Power** Switch	Illuminated switch: supplies power to the unit.
2.	**IN** BNC connector	Video input.
3.	**Amp** trimmer	Controls the video level of the input signal (to be used only if Gain trimmer had insufficient effect!).
4.	**IN Gnd**. pushbutton	When released "floats" the input signal.
5.	**OUT Gnd**. pushbutton	When released "floats" the output signal.
6.	**HF** trimmer	Controls cable equalization of the video output.
7.	**Gain** trimmer	Controls the level of the video output.
8.	**OUT** BNC connector	Video output.
9.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit, directly underneath this connector, a fuse holder houses the appropriate fuse.

5. GETTING TO KNOW YOUR OC-2 VIDEO ISOLATOR

The Kramer **OC-2** is a high quality, dual channel optical video isolator. It is designed to provide complete isolation between video sources and receiving devices such as monitors, projectors, and VCR's. The **OC-2** can eliminate many problems related to video hum, ground loops, DC offsets and other factors, which interfere with video picture quality. Rear panel controls allow fine-tuning of output video levels and frequency response of both channels.

The **OC-2's** active opto-isolator circuits offer linear response and wide frequency range compared to transformer-based units. Rear panel switches are provided which allow the user to select which ground will become floating - input, output, both, or none. The channels are completely isolated from each other. It is rugged, dependable, and is housed in a compact enclosure which can also be rack mounted using an optional rack adaptor which holds two units in one vertical rack space.

Front/Rear panel features of the **OC-2** are described in Figure 2 and Table 2.

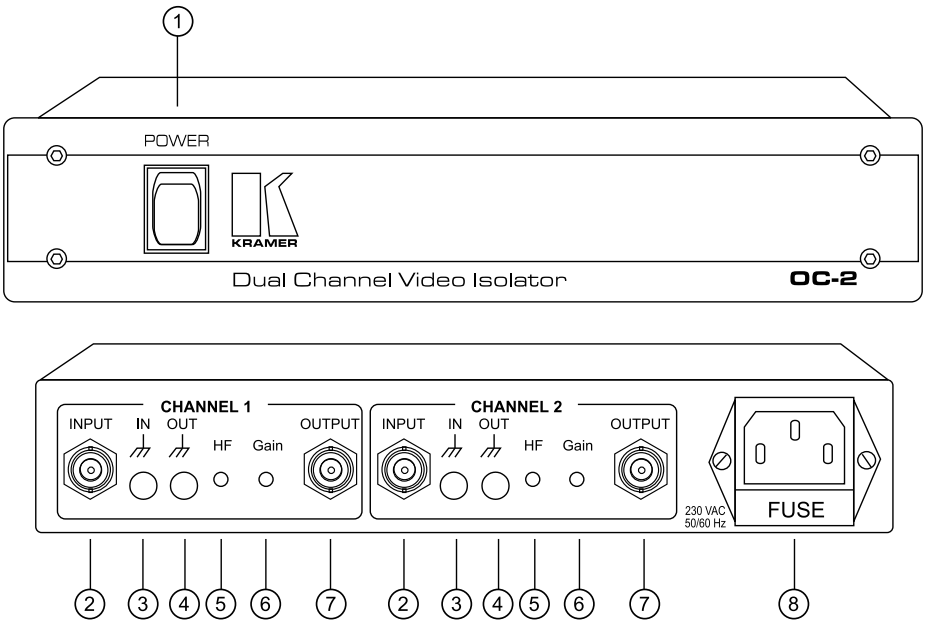

Figure 2: OC-2 front/back features

Table 2: OC-2 Front/Rear Panel Features

	Feature	Function
10.	**Power** Switch	Illuminated switch: supplies power to the unit.
11.	**IN** BNC connector	Video input of each channel.
12.	**IN Gnd**. pushbutton	When released "floats" the input signal.
13.	**OUT Gnd**. pushbutton	When released "floats" the output signal.
14.	**HF** trimmer	Controls cable equalization of the video output.
15.	**Gain** trimmer	Controls the level of the video output.
16.	**OUT** BNC connector	Video output.
17.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit, directly underneath this connector, a fuse holder houses the appropriate fuse.

6. GETTING TO KNOW YOUR OC-4 VIDEO ISOLATOR

The Kramer **OC-4** is a high quality, quad channel optical video isolator. It is designed to provide complete isolation between video sources and receiving devices such as monitors, projectors, and VCR's. The **OC-4** can eliminate many problems related to video hum, ground loops, DC offsets and other factors, which interfere with video picture quality. Rear panel controls allow fine-tuning of output video levels and frequency response of both channels.

The **OC-4's** active opto-isolator circuits offer linear response and wide frequency range compared to transformer-based units. Rear panel switches are provided which allow the user to select which ground will become floating - input, output, both, or none. The channels are completely isolated from each other. It is rugged, dependable, and is housed in a 19", 1U enclosure for installation in a standard 19" rack. Front/Rear panel features of the **OC-4** are described in Figure 3 and Table 3.

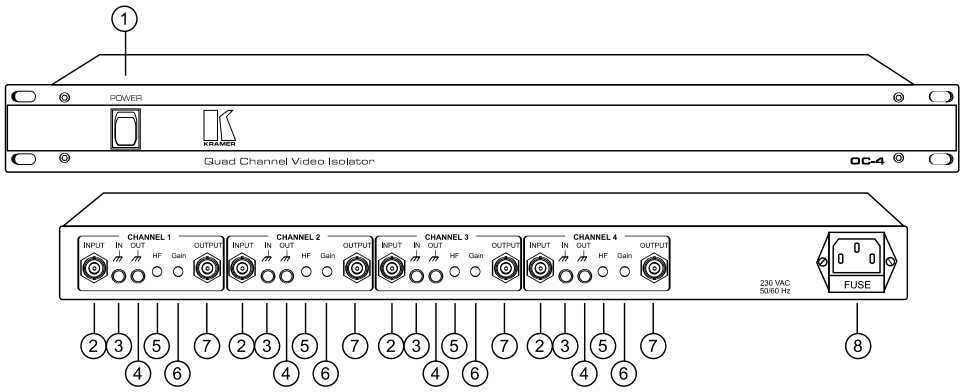

Figure 3: OC-4 Front/Rear Panel Features

Table 3: OC-4 Front/Rear Panel Features

	Feature	Function
18.	**Power** Switch	Illuminated switch: supplies power to the unit.
19.	**IN** BNC connector	Video input of each channel.
20.	**IN Gnd**. pushbutton	When released "floats" the input signal.
21.	**OUT Gnd**. pushbutton	When released "floats" the output signal.
22.	**HF** trimmer	Controls cable equalization of the video output.
23.	**Gain** trimmer	Controls the level of the video output.
24.	**OUT** BNC connector	Video output.
25.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit, directly underneath this connector, a fuse holder houses the appropriate fuse.

7. TYPICAL APPLICATIONS

In all electronic equipment there's is a electrical point connected to "ground". This grounding point may be a real connection to the mains ground or may be "virtual ground", which is a relative internal grounding point, isolated from the external "ground". The ground potential is usually defined as a "zero" voltage potential, where all voltages in the device are referenced to. The virtual ground may sometimes very dangerous, riding on Mains voltages. If two machines are connected, and they are not sharing the precise ground potential, "ground currents" sometimes very hazardous, may flow from one machine to the other. This creates a disturbance in the picture (in video equipment), apparent as running bars on the screen. This flow even might damage the involved equipment or harm the users. This problem is called "Ground Loop", and there are several ways to eliminate it. In many applications the source and acceptor may not be even in the same building, and the "real ground" is physically separate. In those cases ground current flow is unavoidable.

In other applications ground separation may be obligatory by law, such as in medical applications. Video equipment is widely used in the medical field for physical monitoring and surgery. Endoscopes are used instead of interrogative surgery, using sophisticated video cameras and other equipment. In those cases, total galvanic isolation from potential mains or ground flow hazards is mandatory.

One of the ways is to assure a firm ground connection between all machines involved and Mains ground only if a common ground is available. For medical applications, this solution is not sufficient.

Another solution is to separate the grounds of the machines by transformers. This is not suitable for video applications, as high quality video cannot use commonly available transformers due to the inadequate frequency response, and the adverse effect it may have on image quality.

The preferred way is to use special ground-isolation devices such as the OC-1N. In this way, there is a total galvanic isolation between the source and the acceptor, as the signal isolation is mediated by optical means - by a ray of light.
This system is demonstrated by figure 4 below.

Perform the following steps (the same is applicable for two channels with the OC-2 or four channels with the OC-4):

1. Connect the output of the video source to the **IN** BNC connector of the OC-1N.
2. Connect the **OUT** BNC connector of the OC-1N to the inputs of a video acceptor.
3. Operate the source, acceptor and the OC-1N.
4. Use the **GAIN**, **HF**, **GND** controls of the OC-1N as necessary.

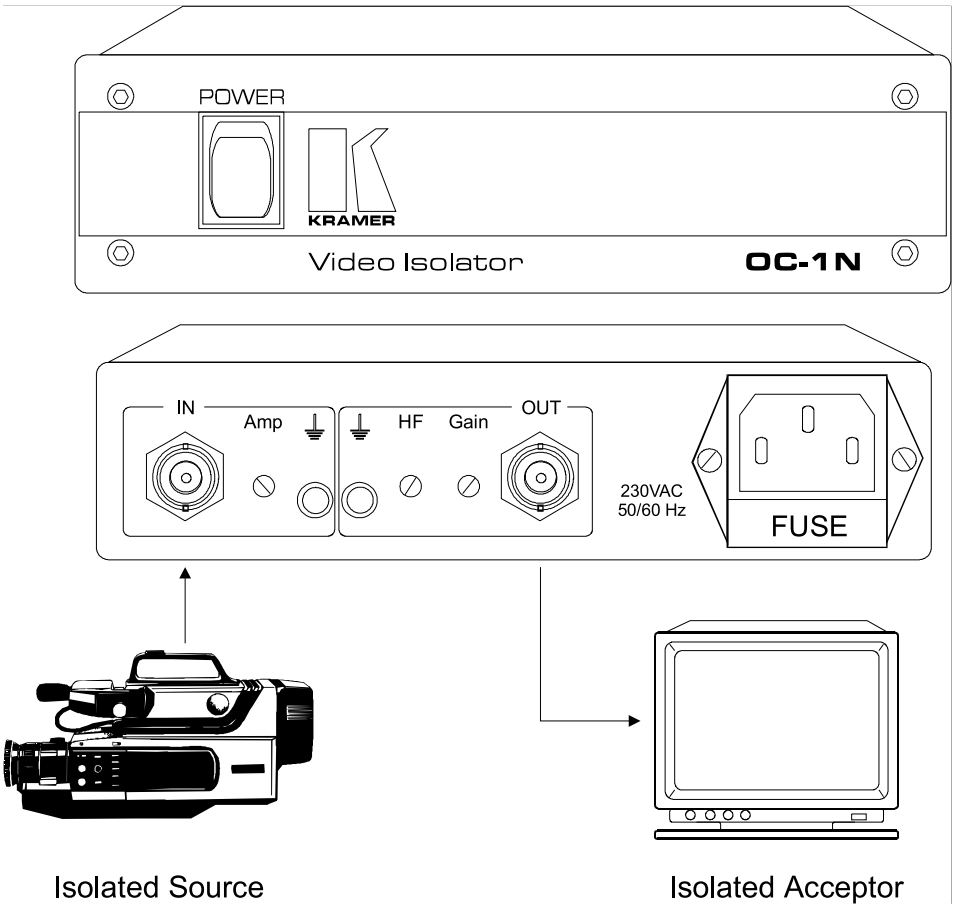

Figure 4: A typical ground isolation setup

8. INSTALLATION

8.1 Rack/Table Mounting

The OC-1N and the OC-2 can be rack mounted using an optional special adapter (see section 3.1). The OC-4 may be directly rack mounted, as it is already 19" sized. The devices do not require any specific spacing for ventilation above or below the units. To mount the machine, simply place the unit's ears against the rack rails of your rack and insert standard screws through each of the four corner holes.

9. CONNECTING TO VIDEO DEVICES

Video sources and output devices may be connected to the OC-1N/OC-2/OC-4 through the BNC type connectors located on the back of the unit. Please keep in mind that the output signal format will match that of the input signal format. The signal supported by the various models is Composite video.

10. USING THE MACHINES

10.1 Powering on the Machine

NOTES

1. The machine should only be powered on, after all connections are completed, and all source devices have been powered on. Do not attempt to connect or disconnect any video to the machine while it is powered on!
2. The socket-outlet should be near the equipment and should be easily accessible. To fully disconnect equipment, remove power cord from socket.
3. Press the toggle switch on the far-left front panel to the up position. The toggle switch becomes lit.
4. Operate the sources and acceptors.

10.2 HF Level Control

HF Control function enables the operator to compensate for degradation of the video signal in high frequencies due to long or non-standard cables. Popular cables such as the RG-59, RG-11 or the RG-179 signal cause degradation/attenuation as shown in the following Table 4:

Table 4: Cable Degradation/Attenuation List

CABLE TYPE	LENGTH	FREQUENCY	ATTENUATION
RG-59	100 meter 100 meter	10MHz 100MHz	3.6dB 11dB
RG-11	100 meter 100 meter	10MHz 100MHz	2.2dB 7.5dB
RG-179	100 meter 100 meter	10MHz 100MHz	8dB 30dB

Degradation and loss of video signal are mainly a result of stray capacitance, which occur in long cables. As longer cables or higher frequency are used, the problem becomes worse, resulting in fine detail loss as well as color degradation. When RGB signals are involved for example, (200-300MHz), degradation is even greater, leading to a total loss of sharpness at high resolution. It is possible to compensate for the problem by using the machines' HF control trimmer. HF control is performed as follows: A Color Bar Generator is connected to machines' input and a Waveform Monitor (or an Oscilloscope with 75ohm termination) is connected to the long cable output. A known color bar signal is applied to the amplifier's input and compared to the signal monitored at the far side. The operator adjusts the **HF** trimmer until the measured output Chrominance signal matches that of the input signal.

10.3 Video Gain Control

The Gain Control function enables the operator to control the picture intensity level or compensate for distortions caused by too long/short cables, for example. Too dark a picture is usually caused by low-level signals and on the other hand, excessive levels "burn" the picture. To correct the incoming signal, the operator adjusts the **GAIN** trimmers until a satisfactory picture is achieved.

If a calibration of the OC series machines is required due to low incoming video signal, connect a calibration setup, as described in Figure 5 and perform the following steps:

1. Connect a video source to the OC machine input through "T" type adapter. You should do it on every channel, if needed, of the OC-2 and OC-4.
2. Connect the other side of the "T " adapter to CH. 1 of an oscilloscope (use as short cable as possible).
3. Connect the output of the OC machine to the CH. 2 of the oscilloscope.
4. Using an appropriate screwdriver, gently adjust the HF and the GAIN trimmers until a both CH. 1 and CH. 2 measured levels are equal.
5. If signal level is still insufficient, gently adjust the AMP trimmer (of the OC-1N only) until satisfactory level and hence proper picture is achieved.

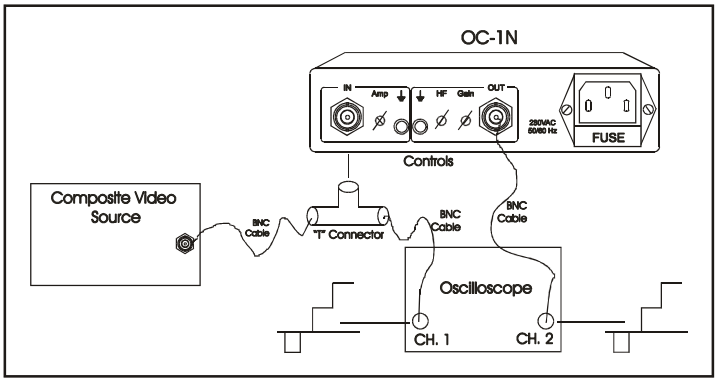

Figure 5: Calibrating and adjusting the OC-1N

11. TAKING CARE OF YOUR MACHINE

Do not locate your machine in an environment where it is susceptible to dust or moisture. Both of these may damage the electronics, and cause erratic operation or failure. Do not locate your machine where temperature and humidity may be excessive. Doing so may also damage the electronics, and cause erratic operation or failure of your machine. Do not clean your machine with abrasives or strong cleaners. Doing so may remove or damage the finish, or may allow moisture to build up. Take care not to allow dust or particles to build up inside unused or open connectors.

12. TROUBLESHOOTING

NOTES

Please note that if the output signal is disturbed or interrupted by very strong external electromagnetic interference, it should return and stabilize when such interference ends. If not, turn the power switch off and on again to reset the machine.

12.1 Power and Indicators

Problem	Remedy
No Power	1. Confirm that the rocker switch is in the "ON" position, and that the red LED is illuminated. 2. Confirm that power connections are secured at the machine and at the receptacle. Make sure the mains receptacle is active. 3. If still there is no power, remove power cord from AC outlet and then using a flat head screwdriver, remove the fuse holder located directly below the power connector on your machine. Confirm that the fuse is good by looking for the wire connected between the ends of the fuse. If the wire is broken, replace the fuse with another, with the same rating.

12.2 Video Signal

Problem	Remedy
No video at the output device	1. Confirm that your source and output devices are powered on and connected properly. The input of your machine should be of an identical signal format at the output of your source. Signals at the output of your machine should be of an identical signal format as at the input of your display. 2. Confirm that any other device in the signal path have the proper input and/or output selected. 3. Use the Video Tester to test the video path leading to/from your machine (see section 3.1 " Video Tester").
Video level is too high or too dim.	1. Verify that the lines are well matched through 75ohm impedances, otherwise it results in a video level that is too high or too dim. 2. Confirm that the connecting cables are of high quality and properly inserted.

13. SPECIFICATIONS

	OC-1N	OC-2	OC-4
Input(S)	1 video 1Vpp/75ohm on a BNC	2x1 video 1Vpp/75ohm on BNCs	4x1 video 1Vpp/75ohm on BNCs
Output(S)	1 video 1Vpp/75ohm on a BNC	2x1 video 1Vpp/75ohm on BNCs	4x1 video 1Vpp/75ohm on BNCs
Video Bandwidth	20MHz, -3dB	20MHz, -3dB	20MHz, -3dB
Non Linearity	0.21dB	0.21dB	0.21dB
Video S/N Ratio	69dB	69dB	69dB
Dimensions (W, D, H)	16.5 x 12 x 4.5 (cm) 6.5" x 4.7" x 1.8"	22 x 18 x 4.5cm (8.7" x 7" x 1.8").	19" (W) x 7"(D) x 1U (H), rack mountable.
Weight	0.72kg. (1.6lbs.) Approx.	1.3 kg. (2.9 lbs.) Approx.	3.5 kg. (7.8 lbs.) Approx.
Power Consumption	2.3VA	6 VA.	14 VA.
Power Source	230VAC, 50/60 Hz, (115VAC, U.S.A.)	230VAC, 50/60 Hz, (115VAC, U.S.A.)	230VAC, 50/60 Hz, (115VAC, U.S.A.)

LIMITED WARRANTY

Kramer Electronics (hereafter Kramer) warrants this product to be free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for three years from the date of the first customer purchase.

WHO IS PROTECTED

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product, which is not distributed by Kramer or which, is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
3. Damage, deterioration or malfunction resulting from:

   a) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature.

   b) Unauthorized product modification, or failure to follow instructions supplied with the product.

c) Repair or attempted repair by anyone not authorized by Kramer.
d) Any shipment of the product (claims must be presented to the carrier).
e) Removal or installation of the product.
f) Any other cause, which does not relate to a product defect.
g) Cartons, equipment enclosures, cables or accessories used in conjunction with the product.

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

Kramer's liability for any defective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

NOTICE

This equipment has been tested to determine compliance with the requirements of:

EN-50081: "Electromagnetic compatibility (EMC);
generic emission standard.
Part 1: Residential, commercial and light industry"

EN-50082: "Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".

CFR-47 FCC Rules and Regulations:
Part 15- "Radio frequency devices:
Subpart B- Unintentional radiators

CAUTION

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied power cord to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com.
Updates to this user manual may be found at http://www.kramerelectronics.com/manuals.html.
We welcome your questions, comments and feedback.

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